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10/566,270	01/30/2006	Tsutomu Fukuda	285291US0PCT	1695

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EXAMINER	
LI, JUN	

ART UNIT	PAPER NUMBER
1793	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/566,270	FUKUDA ET AL.	
	Examiner	Art Unit	
	JUN LI	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *08 April 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-6 and 12-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-6 and 12-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

1. Claim 1, 5-6, 12-16 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ono (US4483940) in view of Giordano et al (Journal of the European Ceramic Society 2002, 22:1811-1822) and Fukuda et al (JP 2002-145659).

Ono teaches a honeycomb carrier supporting a honeycomb catalyst for usage in internal combustion engines including treating exhaust gases (abstract, column 1 lines 24-26), wherein the honeycomb carrier can be any of the ceramic honeycomb carrier including aluminum titanate magnesia (column 8 lines 39-45).

Regarding claim 1, Ono fails to specifically teach the component of the honeycomb carrier is a sintered product containing Mg, Al, Ti containing compound with an empirical formula $Mg_xAl_{2(1-x)}Ti_{(1+x)}O_5$ with addition of alkali feldspar represented by $(Na_yK_{1-y})AlSi_3O_8$ (wherein $0 \leq y \leq 1$).

Giordano teaches sintered product aluminum magnesium titanate $Mg_{0.1}Al_{1.8}Ti_{1.1}O_5$ and $Mg_{0.5}AlTi_{1.5}O_5$ which reads on the recited limitation of Mg, Al, Ti containing compound with an empirical formula $Mg_xAl_{2(1-x)}Ti_{(1+x)}O_5$(abstract). Giordano further teaches that addition of magnesium compound can help improve the

thermodynamic instability of aluminum titante (Al_2TiO_5) at high temperature (page 1812 left column second paragraph lines 12-16).

Fukuda teaches using 1-15 parts by weight of alkali feldspar ($(Na_xK_{1-x})AlSi_3O_8$, $0 \leq x \leq 1$) to increase the mechanical strength and stability of aluminum titanate based sintered compact at 1400-1700 ºC (abstract, machine translated detailed description page 3 paragraph [0012]). Fukuda further teaches that the adding the alkali feldspar can control the grain growth of the sintered compact (machine translated detailed description page 3 paragraph [0014]), achieve a high mechanical strength, low thermal expansion and a stabilizing crystal structure (machine translated detailed description page 5 paragraph [0025]).

It would have been obvious to one ordinary skill in the art at the time of invention filed to adopt the alkali feldspar of Fukuda to improve the sintered product of aluminum magnesium titanate, a magnesium modified aluminum titanate as indicated by Giordano (page 1812 left column second paragraph lines 12-19), to improve the honeycomb carrier for supporting honeycomb catalyst for exhaust gas cleaning. One ordinary skill in the art would have been motivated to do so because the addition of alkali feldspar can improve the mechanical strength, corrosion resistance of the improved thermodynamic stability of the aluminum magnesium titanate of Giordano for future intended uses including internal combustion engines such as automobiles for treating their exhaust gases and depriving them of air pollutants such as nitrogen oxides, carbon monoxides as indicated by Ono (column 1 lines 24-27) and Fukuda (machine translated detailed description page 5 paragraph [0025],[0026]).

Regarding claims 5 and 6, Ono teaches using an alkali metal cerium (Ce) (Example 16, column 13 lines 61-62, Example 18, column 14 line 44) to remove nitrogen oxides NO_x from combustion gas burned in a cylindrical combustion apparatus where an air-methane mixed gas containing 3% methane was introduced into and burned (column 17 lines 14-22). The corresponding catalyst activity for removing NO is shown in Table 6 (column 17-18).

Regarding claim 12 -13 and 16, the recited y and weight range of the alkali feldspar and the recited temperature firing temperature discussed above overlaps with the prior arts, a prima facie case of obviousness exists (See § MPEP 2144.05 [R-5] I).

Regarding claim 14-15, Fukuda further teaches the raw mixture containing TiO_2 and Al_2O_3 and alkali feldspar can be grinded to suitable particle diameter, such as to about 1 μm or less. Fukuda also suggests that there is no particular need about the grade of grinding of a raw material ([0015], [0016]). Thus the recited size is just an obvious modification over the prior art. Furthermore, MPEP points out changes in sizes over prior art cannot make the invention patentable distinct (See § MPEP 2144.04 [R-6] IV).

Regarding claim 18 -20, Fukuda further teaches the sintered compact with addition of alkali feldspar has outstanding erosion proof and corrosion resistance [0025] last 5 lines). It is to be noted that similar composition and similar method of for making a recited honeycomb carrier composition as in the instant applications have been fully disclosed in the applied prior arts, thus similar corrosion resistance associated with addition of alkali feldspar is expected from prior arts' teachings.

Claim 4 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ono (US4483940) in view of Giordano et al (Journal of the European Ceramic Society 2002, 22:1811-1822) and Fukuda et al (JP 2002-145659) as applied to claim 1 above, and further in view of Noda (US2001/0056034).

Regarding claim 4, the combined references of Ono in view of Giordano and Fukuda have been described as above.

Ono further teaches that the cell density of the honeycomb carrier is 300cells/square inch (equals to 46.15 cells/cm^2), reading to the recited limitation of cell density within 15-124cells/ cm^2). Ono also teaches that the thermal expansion of the aluminum titanate magnesium is less than $0.3X10^{-6}$ K^{-1}, which overlaps with the thermal expansion coefficient of the instant claim. MPEP clearly states that in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. See MPEP §2144.05 [R5]. It is also noted that the thermal expansion coefficient is a determined physical property with a compound from chosen materials. Since the honeycomb carrier material is an obvious modification over prior art, its associated thermal expansion coefficient is also expected within similar range as disclosed in the instant application.

The combined references fail to expressly teach that the honeycomb carrier has a wall thickness from 0.05-0.6mm, and the porosity of the partition wall is 20-50%.

Noda teaches that the honeycomb carrier made from aluminum titante with addition of Mg can have a porosity of 5-50%, preferably 10-40% (page 2 paragraph

[0014]), which reads to the recited limitation of porosity of 20-50% in the instant claim 4. Noda indicates that probably porosity is needed to maintain probable honeycomb carrier strength and suppresses the diffusion of alkali metal or alkaline earth metal catalyst into the carrier ((page 2 paragraph [0014]). Noda further teaches that a wall thickness of 0.05-0.1mm with a cell density 62-139.5 cells/cm^2(page 2 paragraph [0023]), reading into the recited limitation of the partition wall thickness of 0.05-0.6mm and cell density 15-124 cells/cm^2 in the instant claims. Noda also indicates that probable porosity and cell density can ensure good cell structure of honeycomb carrier with good bending strength and thermal expansion coefficient (less than $3.0X10^{-6}$ K^{-1}) for effectively purifying NO_x from exhaust gas (page 3 table 1, paragraph [0028]).

It would have been obvious to one ordinary skill in the art at the time of the invention filed to adopt the porosity and cell density of Noda to improve the honeycomb carrier structure of the combined references. One ordinary skill in the art would have been motivated to do so because probable porosity and cell density can ensure good cell structure of honeycomb carrier with good bending strength and thermal expansion coefficient to effectively purify NO_x from exhaust gas (page 3 table 1, paragraph [0028]) and probable porosity can well suppresses alkali metal or alkaline earth metal catalyst into the carrier to ensure the durability of the catalyst (page 2 paragraph [0014] and page 3 paragraph [0029] lines 5-12).

Regarding claim 17, the references of Ono in view of Giordano and Fukuda fail to expressly teach the catalyst comprising potassium.

Ono further teaches alkali metals can be used as honeycomb carrier supported catalyst component (column 2 lines 53-58) and Noda further teaches alkali metals including K can be used as catalyst (page 1 [0004]).

One of ordinary will have been obvious to use potassium as the catalyst component for purifying exhaust gas as shown by Noda because potassium is one of well known alkali metal catalyst component used in the art as shown by Noda and adopting known technique for similar method is well within the scope of one ordinary skill in the art.

Response to Arguments

The previous applied objections to the instant abstract and claim 5 and 6 are withdrawn due to applicant's amendment.

Applicant's arguments filed 03/09/2009 have been fully considered but they are not persuasive.

In response to applicant's argument that amended claim 1 is a honeycomb carrier for an exhaust gas-cleaning catalyst, all the recited composition has been clearly rejected based on prior art of Ono in view of Giordano and Fukuda as discussed above. It is to be noted that the motivation of adding magnesium and alkali feldspar into titanium oxide and aluminum oxide for sintering compact for usage as honeycomb carrier for purifying exhaust gas purification has been clearly indicated in the office action. Furthermore, thermal stability associated with the aluminum titanate are always desired which lead to the modification of aluminum titanate sintered product with

magnesium and alkali feldspar in the art. In addition, adopting known techniques such as adding magnesium and adding alkali feldspar in the field for improving thermal stability and corrosion resistance for improve efficiency of similar product such as for a sintered aluminum titanate or its derivative is well within the scope of one ordinary skill in the art. It is to be noted that effect of adding of alkali feldspar to aluminum titanate (as shown in the prior art) and addition of alkali feldspar to aluminum magnesium titanate (as shown in the instant application, see instant table 1-2 and 2-2) are directed to similar corrosion resistance absent evidence to the contrary.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

It is to be noted that Ono already teaches a honeycomb carrier with catalyst containing alkali metal wherein the material for honeycomb carrier can be made from aluminum titanate materials. It would have been obvious one of ordinary skill in the art would have been obvious to use the improved method with addition of alkali feldspar as taught by Fukuda and addition of magnesium taught by Giordano to provide a better modified aluminum titanate material with higher thermal stability and corrosion resistance to practice the honeycomb carrier of Ono. Thus the applicant's assertion about Fukuda not teaching using the material for honeycomb carrier is not persuasive.

In response to applicant's argument about Noda reference, it is to be noted that Noda teaches physical properties such as porosity, wall thickness etc of honeycomb carrier with an exhaust gas purification catalyst can be obtained. While aluminum titanate is commonly used material as honeycomb carrier used in purifying exhaust gas. Fukuda already teaches adding and mixing different component together and sintering them. The rejections is based on the combinations of all references, the merely allegation of Ono and Noda does not teach some limitation is not persuasive.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it is to be noted that the obvious statement and motivation such as addition of alkali feldspar and magnesium, and using aluminum titanate material for honeycomb carrier with alkali metal catalyst have been clearly stated in the action. Furthermore, the addition of alkali feldspar into titanium oxide and aluminum oxide mixture with or without adding magnesium as demonstrated in the instant specification clearly demonstrated that addition of alkali feldspar provides similar corrosion resistance enhancement and thermal stability as suggested by the applied references for the resulted aluminum

magnesium titanate and aluminum titanate, see example 1-1, 2-1 and table 1-2 and 2-2. Thus the result is predictable from previous prior arts.

Conclusion

1. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JUN LI whose telephone number is (571)270-5858. The examiner can normally be reached on Monday-Friday, 8:00am EST-5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis Mayes can be reached on 571-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JUN LI/
Examiner, Art Unit 1793

/J. L./
05/07/2009

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